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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/828,862	04/10/2001	Kiyotaka Imai	99600-1 DIV	7814

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EXAMINER

VU, QUANG D

ART UNIT	PAPER NUMBER
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2811

DATE MAILED: 12/19/2002

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/828,862

Applicant(s)

IMAI, KIYOTAKA

Examiner

Quang D Vu

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 April 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 3-7 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 3-7 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3, 5.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Specification

The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: The specification never discloses the following claim subject matter as claimed in claim 3: "...implanting arsenic ions in a semiconductor substrate at a first acceleration energy level which suppresses a reverse channel effect to form arsenic ion implanted regions; implanting phosphorous ions in the arsenic ion implanted regions, following the arsenic ion implanting step, at a second acceleration energy level lower than the first acceleration energy level, so as to form a concentration peak of the phosphorous ions located in the arsenic ion implanted regions; and heat-treating the ion-implanted regions for activation of the arsenic ions and the phosphorous ions to form source/drain regions".

Claim Objections

Claim 3 is objected to because of the following informalities: In line 6, change ":" to ",". Appropriate correction is required.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in-

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- (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or
- (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

2. Claims 3-5 are rejected under 35 U.S.C. 102(e) as being anticipated by US Patent No. 5,880,500 to Iwata et al.

Regarding claim 3, Iwata et al. (figure 1) teach a method for manufacturing a semiconductor device. It comprises the steps of:

implanting arsenic ions in a semiconductor substrate (100) at a first acceleration energy level (column 11, lines 8-15).

implanting phosphorous ions (impurity diffusion region [105]) in the arsenic ion implanted regions (impurity diffusion region [108]), following the arsenic ion implanting step, at a second acceleration energy level (column 10, line 66 – column 11, line 3) lower than the first acceleration energy level.

heat-treating the ion-implanted regions for activation of the arsenic ions and the phosphorous ions to form source/drain regions (column 11, line 59 – column 12, line 45); and

forming an NMOSFET having the source/drain (impurity regions [105, 108]).

It is inherent that the arsenic ion implanted regions would suppress a reverse channel effect in the NMOSFET.

Since ^{the} first acceleration energy level (50 keV) of the arsenic ions is greater than the second acceleration energy level (30keV) of the phosphorous ions, the concentration peak of the phosphorous ions would locate in the arsenic ion implanted regions.

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Regarding claim 4, Iwata et al. teach n-type impurities are implanted in the NMOSFET region to form an n-type extension region (impurity diffusion region [107]) before the arsenic and phosphorous implanting steps (column 10, lines 53 – 65).

Regarding claim 5, Iwata et al. teach an acceleration energy and a dosage of the phosphorous ion are determined such at an ion-implanted region (105) of the phosphorous ion extends beyond a bottom surface of an ion-implanted region (108) of the arsenic ion.

It is inherent that a dosage of the arsenic ion is determined to obtain electrical characteristics required for the NMOSFET.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 6-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent No. 5,880,500 to Iwata et al.

Regarding claim 6, Iwata et al. differ from the claimed invention by not showing the acceleration energy of the arsenic ion is not higher than 15 keV, and the acceleration energy of the phosphorous ion is not higher than 10 keV and is lower than that of the arsenic ion. It would have been obvious to one having ordinary skill in the art at the time the invention was made for the acceleration energy of the arsenic ion is not higher than 15 keV, and the acceleration energy of the phosphorous ion is not higher than 10 keV and is lower than that of the arsenic ion, since it

has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involve only routine skill in the art. In re Aller, 105 USPQ 233.

Regarding claim 7, Iwata et al. differ from the claimed invention by not showing the dosage of the arsenic ion is between $2 \times 10^{15}/\text{cm}^2$ and $1 \times 10^{16}/\text{cm}^2$, and the dosage of the phosphorous ion is between $5 \times 10^{14}/\text{cm}^2$ and $2 \times 10^{15}/\text{cm}^2$. It would have been obvious to one having ordinary skill in the art at the time the invention was made for the dosage of the arsenic ion is between $2 \times 10^{15}/\text{cm}^2$ and $1 \times 10^{16}/\text{cm}^2$, and the dosage of the phosphorous ion is between $5 \times 10^{14}/\text{cm}^2$ and $2 \times 10^{15}/\text{cm}^2$, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involve only routine skill in the art. In re Aller, 105 USPQ 233.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Quang D Vu whose telephone number is 703-305-3826. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 703-308-2772. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

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qv

December 16, 2002

Steven Loh